

NUTRIENT TRENDS AND LOADS IN NORTHEASTERN U.S. RIVERS, 1975-2003

Elaine C. Todd Trench, U.S. Geological Survey
John R. Mullaney, U.S. Geological Survey
R. Edward Hickman, U.S. Geological Survey
Gregory E. Schwarz, U.S. Geological Survey
Richard B. Moore, U.S. Geological Survey
Elizabeth A. Ahearn, U.S. Geological Survey

U.S. Geological Survey
101 Pitkin Street
East Hartford, CT 06108

ABSTRACT

A regional synthesis project conducted by the U.S. Geological Survey (USGS) National Water-Quality Assessment Program (NAWQA) evaluated trends and loads for nitrogen and phosphorus during 1975-2003 and 1993-2003 for river basins in the New England and Mid-Atlantic Regions. With an area of 166,000 square miles and a population of 59 million, this region represents nearly 21 percent of the U.S. population yet only encompasses about 5.5 percent of the land area of the conterminous U.S. Urban nutrient sources dominate water quality in many areas, particularly near the coast, but agricultural sources are important in some drainage basins.

Annual loads of total nitrogen, nitrite-plus-nitrate, and total phosphorus were estimated for 31 stations during the 1975-2003 period and for 46 stations during the 1993-2003 period. Nutrient data were also analyzed for monotonic trends in concentration, flow-adjusted concentration, and load during both periods. During 1975-2003, an upward trend in total nitrogen load was detected at one station, downward trends at 11 stations, and no significant trend at 19 stations. Upward trends in loads of nitrite-plus-nitrate nitrogen were detected at 7 stations, downward trends at 8 stations, and no significant trend at 16 stations. Downward trends in total phosphorus loads were detected at 16 stations; no upward trends were detected, and data for 15 stations showed no significant trend. Few statistically significant trends in nutrient loads were detected during the 1993-2003 period, although numerous trends in flow-adjusted concentration were detected. A trend in streamflow was detected at only one station in each of the two periods analyzed. Consequently, trends in nutrient loads, coupled with similar trends in flow-adjusted concentrations, may indicate changes in delivery of nutrients to streams. Preliminary evaluation of trends in flow-adjusted concentrations and loads in drainage basins with point source discharges, for long-term and recent periods, indicates that in basins with downward trends, the major reductions in nutrient concentrations and loads took place prior to the 1990s. This is consistent with the general history of wastewater treatment improvements and phosphate detergent bans in the northeastern U.S.

KEYWORDS

Nutrient trends, nutrient loads, nitrogen, phosphorus, northeastern U.S. rivers.